Oral nutritional supplements in care homes and the community: Nutrition review and staff education.







Oral Nutritional Supplements in Care Homes and the Community:

Nutrition Review and Staff Education

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Contents

Executive Summary

The University of Derby's Health and Social Care Research Centre has been commissioned to support the delivery of Southern Derbyshire CCG's review of oral nutritional supplements (ONS) and education of care home staff. Southern Derbyshire currently spends £1,409,099 on ONS prescribing (SH3-OT26 PID, 2016). While the efficacy of the use of ONS in malnourished patients is well understood (Agarwal, Miller, Yaxley, & Isenring, 2013), their use may not always be appropriate and other methods such as food fortification may result in either equal or better outcomes for considerably lower cost (Baldwin & Weekes, 2012).

A successful pilot in five care homes by Southern Derbyshire CCG achieved cost savings of £183,203.33, along with the associated benefits of increased dietetic support to those residents who required input. On this basis, building on the pilot work, the present programme of work was conceived. Broadly, the project aimed to: (a) improve the nutritional state of residents in 112 care homes and at home; and (b) reduce spend on ONS prescribing. This was divided into two work streams: (1) evaluating the efficacy of a training programme on the identification, prevention and treatment of malnutrition, through a "Food First" approach including MUST training; and (2) the assessment, review and support of GP practices with patients prescribed ONS within their own home.

This report provides an overview of the work done by the dietetics team up until the end of February 2018. The analysis of the dataset provides context for the recommendations presented. The following is an executive summary of the key findings from the analysis of the data set, the detailed overview provides further context (Detailed Overview, page 5).

Headlines

Work within care homes across Southern Derbyshire has resulted in:

- **4602 residents assessments made over 77 care homes** up until the end of February 2018;
- Total potential cost savings amounted to £25,130 (first month after ONS review). Of the residents prescribed ONS at the time of review, 249 received no change in their prescription; the cost savings per month resulted because of 226 stopped prescriptions (£17,460) and 193 switches (£7,669). However, issues with implementation were identified, with an uptake of advice only 49% to 67% of the time. Based on the uptake of advice, projected **12-month savings of £169,660** and **part-year savings until the end of March 2018 of £82,790** may be expected (rounding months to the nearest whole).
- Trained care home staff reported being confident in MUST assessments and food fortification. An intention to change practice based on the training was widely expressed. However, this did not translate into changes in the accuracy of MUST scoring, with correct scores remaining at around 70%.
- There were no notable changes (either between interventions or over time) in residents' anthropometrics or outcomes, including hospital admissions, length of stay or UTI infections.
- Data suggests that there was a low uptake of the implementation of ONS changes made by the dietetics team, with recommendations only acted upon around 40% to 60% of the time. Through subsequent conversations, it is apparent that these issues are likely related to the uptake of advice by GPs.
- Despite advice implementation issues, stops and switches still amount to considerable cost savings and are a testimony to the efficacy of the ONS review and education of care home staff. Further, **cost savings are realised without any apparent change in residents' outcomes**.

Work with the patients of GP Practices prescribed ONS has resulted in:

- **117 patient assessments made over 5 practices** up until the end of February 2018, with hundreds more shortlisted;
- Total cost savings amounted to **£2,766** (first month after ONS review). Of the patients prescribed ONS at the time of review, 83 required no change in prescription; cost savings resulted because of 35 stopped prescriptions (£1,950) and 17 switches (£816). Projected **12-month savings of £116,100** and **part-year savings until the end of March 2018 of £33,201** (rounding months to the nearest whole).
- Further indirect benefits have been derived from the dietitians' work reviewing GP practice patients, including becoming a point of reference for the GP practice, the practice's awareness of ONS cost savings and improved communication between the hospital and the GP practice.

Conclusion and Recommendations

The programme of work of Southern Derbyshire CCG and Derby Hospitals Community Dietetic Team in care homes has resulted in significant cost saving, with no appreciable change in patient's outcomes. However, while care home staff reported greater knowledge of MUST scores, food fortification and that their practice would change, following training there were no appreciable changes in MUST scoring accuracy (R1). Issues were also identified with the implementation of the ONS prescription recommendations, with only 49% to 67% acted on; it is recommended that data is recorded in a way that advice uptake can be monitored (R2) and closer relationships with GPs are developed, to ensure that changes are implemented (R3). As a result of the low uptake of recommendations, future work should continue to consider the impact on residents outcomes (R4 & R5). Finally, given the financial saving realised through the review of ONS prescriptions in GP practices and benefits of improvements in GP understanding, future work may consider expanding the number of practices involved and including elements around increasing GP education of ONS prescription and alternative interventions (R6).

Recommendations

R1 – The dietetics team should consider further training for care home staff on MUST scoring as, while staff are confident in its use, the training did not translate into improved accuracy of scoring.

R2 – To facilitate the assessment of the implementation of recommendations dietitians should record reviews on a 'one patient per row' basis, rather than 'one review per row' in order to follow patients through.

R3 – Future work must consider the relationship between the care home, GP practice and dietitian to improve the uptake of dietetic advice.

R4 – Future implementations of the review of ONS in care home residents should continue to adopt methodologies that allow for the efficacy of the intervention to be determined, as the current project is inconclusive due to the low uptake of advice.

R5 – Future work may wish to consider handgrip strength, functional movement and/or depression, which may be key outcomes in Food First methods of the management of malnourished residents.

R6 – Future work should continue to explore ONS in community settings. There may be a benefit to GP education around the prescribing of ONS.

Detailed Overview

Context and Aim

Southern Derbyshire CCG currently spends £1,409,099 on Oral Nutritional Supplement (ONS) prescribing (SH3-OT26 PID, 2016). The efficacy of the use of ONS in malnourished patients is well understood (Agarwal et al., 2013), however, their use may not always be appropriate or acceptable and other methods, such as food fortification, may result in either equal or better outcomes for considerably lower costs (Baldwin & Weekes, 2012). Based on this premise, in 2016 Derby Hospitals Community Dietetic Team completed a pilot project within five Derbyshire nursing and care homes around the education of care home staff. This was comprised of a dietitian and dietetic assistant practitioners reviewing residents and providing educational support to care home staff on identifying malnourished residents and appropriate management using a "Food First" approach. The outcomes of the pilot were (a) improved nutritional state of patients measured by an improved Body Mass Index (BMI) and Malnutrition Universal Screening Tool (MUST) score, (b) increased percentage weight gain and reduced length of stay in hospital if admitted and (c) reduced spend on ONS prescribing.

Following the success of the initial pilot project, which resulted in improved residents' outcomes and cost savings of £183,203.33, Southern Derbyshire CCG and Derby Hospitals Community Dietetic Team set out to (a) extend the initial pilot review across care homes in Derbyshire; and (b) review the use of oral nutritional supplements of patients in their own home and identifying those needing dietetic input within Southern Derbyshire CCG. Based on these aims, the following sections will discuss relevant literature, the methodology used for both the care home and GP practice interventions and the results. Finally, a brief discussion of the results will be presented, followed by our conclusions and recommendations.

Review of Literature

Malnutrition is a notable factor in the health and wellbeing of the elderly in hospital and community settings, including care home residents. National data support that more than three million people in the United Kingdom are affected (Russell & Elia, 2010). While there is no universally accepted definition of malnutrition, one of the most commonly used is *"a state of nutrition in which a deficiency, excess or imbalance of energy, protein, and other nutrients causes measurable adverse effects on tissue/body form (body shape, size, composition), function and clinical outcomes"* (Stratton, Green, & Elia, 2003).

Older adult care home residents are especially vulnerable to the effects of disease-related undernutrition and malnutrition, with 30 to 40% UK adults at medium to high risk within 6 months of admission (Russell & Elia, 2008; Russell & Elia, 2009, 2011). Further, national nutritional surveys, completed between 1994 and 2011, state that the number of patients presenting to hospital with malnutrition is unacceptably high (Ray, Laur, & Golubic, 2014). Care homes play an important role in the cycle of malnutrition and patients admission to hospital, and they are well placed to detect risk and prevent under-nutrition in the elderly.

The underlying reasons for malnutrition in older persons, including those in care homes, are diverse and include ageing, inadequate food intake, and acute and chronic medical conditions (Agarwal et al., 2013; Ahmed & Haboubi, 2010). Malnutrition in the elderly is multi-faceted, often conceptualised as consisting of physiological, psychological, social and economic parameters, which may be referred to as the "nine d's" (dementia, dysgeusia, dysphagia, diarrhoea, depression, disease, poor dentition, dysfunction, and drugs) (Agarwal et al., 2013). Often, older adults do not suffer from malnutrition alone, many also struggle with the loss of lean body mass (sarcopenia), strength and functionality (Sauer, Alish, Strausbaugh, West, & Quatrara, 2016). Furthermore, older adults are more likely to be hospitalised for illness, injuries and surgeries, further increasing the risk for malnutrition and accelerating the loss of lean

body mass, resulting in weakness, decreased mobility and functionality (Cangelosi, Rodday, Saunders, & Cohen, 2014; Covinsky et al., 2003).

The effects of malnutrition on health and wellbeing in older people are serious and can affect almost every function, organ and system of the human body (Correia & Waitzberg, 2003) and, therefore, has been associated with a range of serious negative outcomes with implications for health and recovery from illness and surgery (Corish & Kennedy, 2000). The effects of malnutrition and dehydration include increased falls, vulnerability to infection, loss of energy and mobility, poor wound healing, confusion and ultimately an increased risk of mortality (Bergstrom & Braden, 1992; Kinney, 2004; Laghi & Tobin, 2003). In nursing homes, the presence of low body mass index (BMI) is associated with lower quality of life (Crogan & Pasvogel, 2003). Also importantly, food and drink also have a social importance over and above their health effects, providing comfort and stimulation (Sidenvall, 1999; Stanner, 2002; Stollmeijer, Harbers, & Mol, 1999).

The total public health and social care costs associated with adult and child malnutrition in England has been estimated at £19.6 billion (2011-2012 data; Elia, 2015). In line with the general distribution of health and social care spending in England, predominately, the expenditure occurs due to healthcare, rather than social care, and secondary rather than primary provision involving older adults. The large contribution of institutionalised care to total costs may be attributed not only to the high cost of institutionalisation but also to the prevalence of malnutrition in hospitals and care homes. However, since more than 90% of the malnutrition originates and exists outside of hospital, preventive measures should be undertaken in the community to reduce the clinical economic burden of malnutrition (Elia, 2015).

Few patients who are at risk of malnourishment are identified in the absence of a nutrition screening system (McWhirter & Pennington, 1994). Consequently, a key tenant of preventative measures should be the effective and early identification of malnutrition (Elia, 2015). To meet the need for an objective universal screening tool, the British Association for Parenteral and Enteral Nutrition (BAPEN) developed and launched the Malnutrition Universal Screening Tool (MUST; Elia, 2003). MUST is a three-part screening tool to identify adults who are malnourished or at risk of malnutrition. The tool incorporates (1) height and weight measurements to calculate body mass index (BMI); (2) unplanned weight loss; and an (3) an acute disease effect score, where a patient is acutely ill and there is likely to be no nutritional intake for more than five days (Elia, 2003). The MUST was the first tool specifically designed to screen patients for the risk of malnutrition in all care settings enabling ~~a~~ consistent criteria to be used both primary and secondary care (Elia, 2003). The MUST has been validated across healthcare settings, with high predictive validity in the hospital environment (length of stay, mortality in older people, and discharge destination in orthopedic patients) (Stratton et al., 2004); and has been demonstrated to be more efficient and faster than most other screening tools (3 to 5 minutes) (Stratton et al., 2004). The MUST is the recommended screening tool by the National Institute for Clinical Excellence (NICE), the British Association for Parental and Enteral and Nutrition (BAPEN) and the British Dietitian Association (BDA).

Critically, once a malnourished patient has been identified then malnutrition can be managed by dietary advice to optimise oral intake as well as with the use of oral nutritional supplements (Mountford, Okonkwo, Hart, & Thompson, 2016). The efficacy of various interventions for improving nutritional or clinical outcomes of patients and residents have been investigated by a number of authors; from this research it is known that if malnutrition is identified early and an intervention takes place then improved patient outcomes and better quality of life result (Agarwal et al., 2013). However, it is also been acknowledged that there is a lack of unbiased large randomised controlled trials in the published literature and reviews have highlighted that not enough research has been done to demonstrate the nutritional- and cost-effectiveness of interventions (Weekes et al., 2009).

Research investigating post-hospital discharge interventions of acute care patients at nutritional risk have demonstrated lower mortality and moderate improvements in the nutritional status of the intervention

group (Feldblum, German, Castel, Harman-Boehm, & Shahar, 2011). The randomised controlled trial involved 259 elderly acute care patients, who were randomly assigned to either intervention: receiving individualised nutritional care from a dietitian and three post-discharge home visits, or control: receiving either a single dietitian visit during hospitalisation or standard care (no dietitian review). Improvements in nutritional status, as recorded using the mini nutritional assessment score, and mortality were recorded, and there were also small significant differences in serum albumin, no differences were found in any other health status, biochemistry, cognitive, emotional and functional parameters recorded (Feldblum et al., 2011). Similarly, Neelemaat, Bosmans, Thijs, and Seidell (2012) randomised control trial, with 210 patients assigned patients to either an intervention group, who received nutritional supplementation and telephone counselling by a dietician until three months after discharge from hospital, or a control group, who received usual care. The study demonstrated significant improvement in functional limitations and was neutral in costs (Neelemaat et al., 2012). Supporting both these findings, a systematic review and meta-analysis of randomised controlled trials evaluating the use of oral nutritional supplements (ONS) in medical and surgical patients (aged over 65 years) also established positive associations with dietary intake and weight status (Beck, Holst, & Rasmussen, 2013).

Despite the prevalence of studies exploring the efficacy of nutritional interventions in outpatients, there is only limited evidence of the effectiveness of nutritional screening and nutritional interventions on the clinical, nutritional and well-being outcomes of older adult community care home residents. In one of the few studies, Mountford et al. (2016) investigated the effectiveness of two interventions in a randomised cohort study. The two interventions were (1) residents with a MUST score of one were allocated to receive advice from a community dietitian on strategies to increase oral intake including meal size, ways to increase protein, and energy intake with normal food and prompting; (2) residents with a MUST score of two or more at baseline were allocated to receive the same dietary advice as those residents with a score of one, but in addition to this they were prescribed ONS. It was reported that the three-month intervention with ONS and dietary advice did not improve the overall nutritional status of older adult care home residents at high risk of malnutrition (MUST score two). There was, however, evidence that dietitian advice alone did improve nutritional status in those earlier in the process of malnutrition (MUST score of one). The results of Mountford et al. (2016) do not support the widespread use of ONS to improve nutritional status in older adult community care home residents. It was recommended that dietitian input early in the malnutrition process in residents at risk, but who are not grossly malnourished (MUST score of one), may improve nutritional status in at least some cases.

Beyond the effectiveness of the use of ONS with malnourished care home residents, the efficacy of which has been questioned by Mountford et al. (2016), the acceptability and appropriateness of ONS should also be considered. This is especially important given other factors related to food, for example, its social importance (Sidenvall, 1999; Stanner, 2002; Stollmeijer et al., 1999). A systematic review by Milne, Avenell, and Potter (2006) and colleagues considered the clinical and nutritional outcomes of 55 studies in older people offered supplements in different settings. While the review found that supplements could improve the nutritional status of older people, leading to small gains in weight and muscle mass, the authors identified that elderly people may have difficulty accepting supplements as a result of reported gastrointestinal disturbance (Milne et al., 2006). Another approach, ‘Food First’, is considered as an alternative to the prescription of ONS though the fortification of regular meals.

Although there is limited research into the efficacy of food fortification approaches a number of studies do support its use for the treatment and prevention of malnourishment. Olin et al. (2003) were able to demonstrate the efficacy of a food fortification through the comparison of standard 1600kcal/day diet, control group, or a 2100 kcal/day experimental group. Olin et al. (2003) found that increasing the energy density of meals through food enrichment can increase an individual’s overall caloric intake by up to 30%, while also allowing the maintenance of activities of daily living, unlike the control group. Similarly, a systematic review of the dietary counselling indicated that counselling gave comparable increases in weight to ONS use (Baldwin & Weekes, 2012). Considering the evidence presented, food fortification,

food first approaches and dietary counselling may offer an alternative to the use of ONS in certain lower risk situations. Southern Derbyshire CCG's pilot also supports these conclusions.

To summarise, malnutrition is an important consideration in the populations' health and wellbeing, particularly for older adult care home residents. Given that more than 90% of the malnutrition originates and exists outside secondary care, preventive measures should be undertaken in the community to reduce its clinical and economic burden. The early identification and implementation of appropriate interventions are essential in ensuring positive resident outcomes and reducing the malnutrition cycle. Further, inappropriate prescribing also contributes to the costs associated with the management of malnutrition, for some residents a 'food first' approach may be more appropriate, for others they may no longer need supplementation. Considering the literature reviewed, it is anticipated that the review and education of care home staff around a 'food first' approach will result in maintenance or improvements in residents' outcomes and a reduction in spending on ONS. Furthermore, in a care home setting, the review of prescribing of ONS in the community is likely to result in the identification of a large number of inappropriate prescriptions, and considerable cost savings.

The following section describes the methods and results for the two programmes of work. Firstly, the methods and results for evaluating the efficacy of a training programme on the identification, prevention and treatment of malnutrition, through a "Food First" approach including MUST training. Secondly, the methods and results for the assessment, review and support of GP practices with patients prescribed ONS within their own home.

Methods – Care Homes

Overview

One hundred and twelve care homes were invited to take part in the evaluation. Inclusion criteria were that the home was located within the Southern Derbyshire Clinical Commissioning group's geographical area. To date, 77 care homes have been approached and have consented to take part in the evaluation (three opportunities were provided to participate). Data was considered in two phases. For the first cost savings and training feedback were considered across all 77 homes, secondly further more detailed analysis was conducted on cluster-randomised data for a subset of the care homes.

The second phase consisted of a cluster randomised, waiting list controlled, evaluation with an intervention, which recruited care homes and residents from 112 care homes across Southern Derbyshire. This consisted of a 'no difference' trial paradigm in which all care home staff were given access to the same intervention but the timing of the delivery of the intervention was staggered. The evaluation was conducted between August 2017 and February 2018. Care homes were randomly assigned to one of two groups: (1) training and review intervention [Train: Group 1]; (2) wait to receive the intervention [Wait: Group 2]. There were no exclusion criteria to care homes taking part; however, residents were excluded based on the criteria set out below.

The evaluation consisted of three phases: (1) initial screening phase: collection of baseline data from all eligible residents; (2) Intervention phase: care home staff received training on 'food first' concept, all those residents identified as malnourished via MUST screening in phase 1 received the intervention; (3) follow-up data were collected at the end of the three-month intervention period and 6-month follow-up.

The work was considered and approved as a service evaluation by the University of Derby Health and Social Care Research Ethics Committee. Access to the ONS dataset was provided by Tom Goodwin (Medicines Management Lead Pharmacist) NHS Southern Derbyshire Clinical Commissioning Group.

Inclusion criteria

Residents within care homes were eligible for entry in to the screening phase of the study if they were: (1) permanent residents in a care home within Southern Derbyshire Clinical Commissioning group's geographical area; (2) over the age of 18; (3) not receiving end of life care; and, (4) able to eat and drink.

Exclusion criteria

Residents were excluded from the initial screening phase of the study if they were: (1) outside of Southern Derbyshire Clinical Commissioning group's geographical area; (2) under the age of 18; (3) receiving end of life care and with a life expectancy less than 2 months; (4) unable to eat or drink, solely NG/enteral tube feeding; (5) declined to be weighed or have anthropometric measurements taken (6) dietitian deem resident not suitable; and (7) residents under specialist dietetic input or another trust e.g. Mental health.

Screening

Care home residents were initially screened for nutritional status using the MUST tool and current prescription of nutritional supplements. 'MUST' is a five-step screening tool to identify adults, who are malnourished, at risk of malnutrition (undernutrition), or obese. It also includes management guidelines, which can be used to develop a care plan (available from BAPEN Office, Redditch and online at www.bapen.org.uk). It was chosen for use in this study because it is validated in care home residents and is in widespread use in the UK, including across Southern Derbyshire. It incorporates height and weight measurements to calculate body mass index (BMI), unplanned weight loss, and an acute disease effect score where a patient is acutely ill and there is likely to be no nutritional intake for more than five days (Table 1).

Table 1: *Possible MUST scores and BMI and weight change characteristics.*

MUST Score	BMI		Unplanned Weight Loss in the past 3–6 months
0	>20	and	<5%
1	18.5–20	or	5%–10%
2	<18.5	or	>10%
3	18.5–20	and	>10%
3	<18.5	and	5%–10%
4	<18.5	and	>10%

Prescriptions of nutritional supplements were recorded, including the name, current dosage, units per month, cost per unit and length of prescription.

Measurement

Data collected during the initial screening phase included age and anthropometric measurements of height, current weight and weight 3 months prior. From this data a score for the MUST BMI (body mass divided by the square of the body height) and weight loss score (change of <5%, 5%–10%, >10%) were calculated. Total MUST screening score was calculated from these two variables. Previous care home assessments of MUST scores were also noted. Existing ONS use was noted (including the name, current dosage, units per month, cost per unit and length of prescription).

Residents' weight was measured using seated scales, hoist scales or standing scales. Height was measured using stadiometer. If it was not possible to record the residents' height then it was derived from ulnar measurement, using the conversion charts within the MUST toolkit. If it was not possible to record height or mass, BMI was estimated from Mid Upper Arm Circumference (MUAC): If MUAC was <23.5 cm, BMI was likely to be <20 kg/m^2 (scored as MUST 1), If MUAC was >32.0 cm, BMI was likely to be >30 kg/m^2 (scored as MUST 0).

Data on the occurrence in the previous three months of a number of key characteristics were collected:

a) the number of hospital admissions and each admission duration;
b) residents' falls and their frequency of occurrence;
c) urinary tract infections (UTIs) and the frequency of their occurrence;
d) pressure sores and their grade. Pressure ulcers are graded with increasing severity from category 1 to 4, according to the European Pressure Ulcer Advisory Panel classification system (EPUAP, 2009).

Three and six months after commencement of the study intervention, the baseline measures were repeated.

Interventions

Clusters of residents as care homes were randomly assigned to either intervention or wait group. Such a design is often acceptable to communities who would not be comfortable with a no-treatment group. The intervention consisted of two phases (1) training of care home staff in "Food First" approach including MUST training; (2) assessment of nutrition action plans and appropriateness of current ONS prescriptions. The wait group received the intervention after completion of the 3-month review.

The intervention consisted of the following. Firstly, following the baseline assessment, the dietitian and dietetic assistant practitioners completed a two-hour training programme on the identification, prevention and treatment of malnutrition, through a "Food First" approach including MUST training. The training was a whole team approach, including a manager, trained staff, catering staff and health care assistance and required a minimum of 10 staff to attend for each care home. To complete the training the staff were asked to put together a nutritional action plan, which consisted of an individualised strategy, making the learning relevant to their workplace and allowing the carers to take ownership of changes that needed to take place. Additional support was provided to care homes that felt it was required, consisting of additional training or further dietetic reviews. Secondly, at the point of review, the dietitian also assessed the appropriateness of current ONS prescriptions and amended the prescription where required. Pharmacist colleagues already working within care homes/GP practices were then able to assist in the reduction of ONS prescriptions where appropriate in line with Medicine Management guidance and clinical judgement.

Statistical Analysis

Normal distributions were ascertained, and homogeneity of variances were confirmed after visual assessment of the frequency histogram and a Shapiro–Wilk's test, respectively. All values are reported as mean ± SD. For meaningfulness, mean differences (MD) and 95% confidence intervals ($CI_{95\%}$) were used. Analysis was on an intention to treat basis (last value carried forward). Where possible the magnitude of the group difference were calculated by independent samples *t*-tests or mixed ANOVA (assessment x intervention). The magnitude of the difference were determined using Cohen's *d* for comparisons between two groups and η_p^2 for multiple comparisons. Statistical analysis was carried out using the software package SPSS (Version 22, SPSS Inc. Chicago, Illinois, USA).

Results – Care Homes

Overview and screening

Of a possible total 112 care homes across Southern Derbyshire, 77 care homes were included in at least the baseline phase of data collection. Figure 1 provides a breakdown of care homes inclusion, recruitment and allocation into intervention groups. The data up until the end February 2018 consisted of 4602 records (2188 baseline; 1410 3-month review; 1004 6-month review), made up of 2100 unique residents. Further training and reviews are due to take place beyond the end of the 2017-2018 financial year, the numbers presented represent work completed up until the end of February 2018.

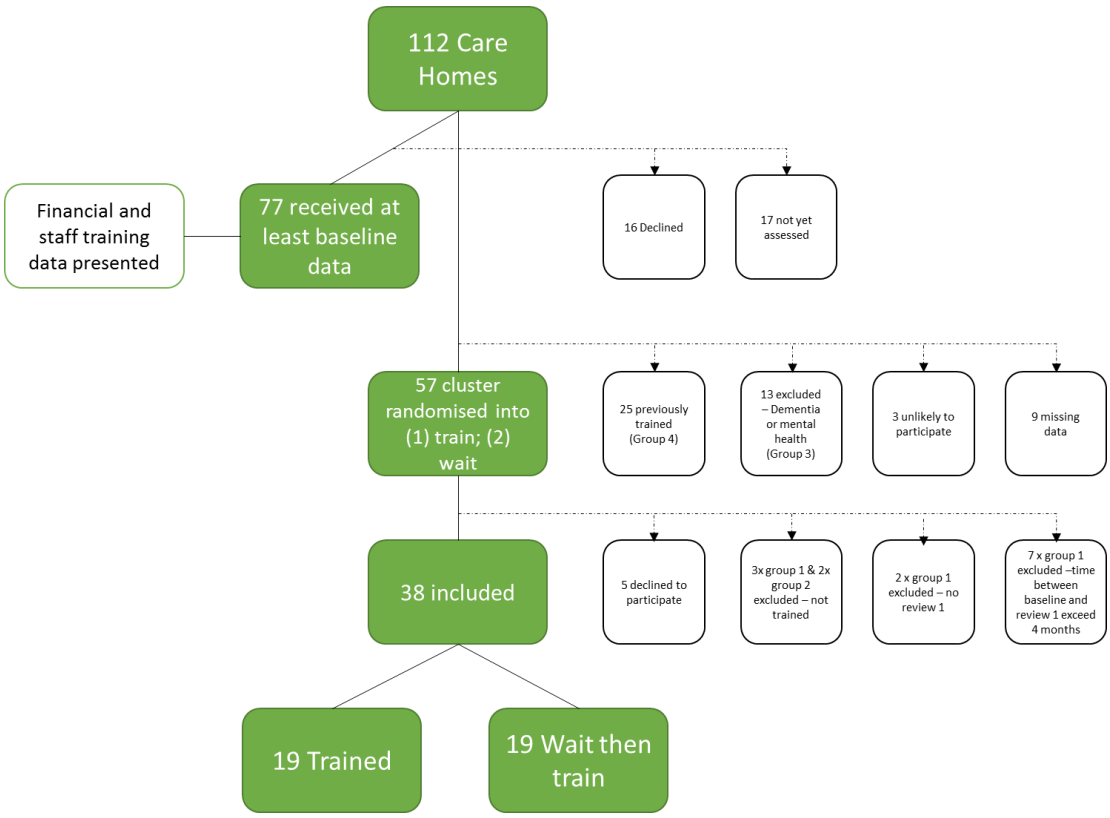

Figure 1: *Recruitment, retention and allocation to study interventions.*

Training Feedback

Feedback from the training of staff across the 77 care homes was overwhelmingly positive (Table 2). Staff expressed that they were now confident in MUST scoring either immediately (75%) or would be following a practice (22%), only two were not confident, no comments were provided by these two staff members. All but one member of staff stated that they were now confident in food fortification (99%); the one member of staff who was not confident did not provide feedback on why. Of the trained staff, 93% stated they will change their way of working; it is not clear why 38 members of staff stated that they would not change practice, it may be that this was based on existing knowledge or a reluctance to change.

Table 2: *Care home staff (n = 525) feedback on MUST and Food First training.*

n = 525	Yes	Yes with practice	No
Will change way of working	468 (92.5%)	-	38 (7.5%)
Confidence in MUST scoring	381 (75.0%)	111 (21.9%)	2 (0.4%)
Confidence in Food Fortification	515 (99.8%)	-	1 (0.2%)

Financial Summary

Across all 77 included care homes and 4,602 resident records, up until the end of February 2018, total cost savings amounted to £25,130 (first month after ONS review). Of the residents prescribed ONS at the time of review, 249 received no change in their prescription; cost savings per month resulted because of 226 stopped prescriptions (£17,460) and 193 switches (£7,669). However, issues with implementation of ONS advice were identified, with uptake of advice occurring 40% to 60% of the time. Based on the

uptake of advice projected 12-month savings of £169,660 and part year savings until the end of March 2018 of £82,790 are expected (rounding months to the nearest whole).

Descriptives of the residents included in the randomisation

Fifty-seven of the 112 possible care homes were randomly assigned to train or wait intervention groups (25 had previously been trained; 13 were excluded based on the specialty of the care home; 3 had previously declined; 9 were missing data). Of the 57, 19 were included in the final analysis for each group (5 declined to participate; 5 had yet to be trained due to scheduling issues; 2 had yet to receive follow up reviews due to scheduling issues; 7 excluded due to too greater time between baseline and 3-month review; Figure 1).

Descriptive characteristics of the residents in the train and wait groups are presented in **Table 3**. Small statistically significant difference between the training and wait group were apparent in weight and BMI, with greater weight (Mean Difference [MD] = 2.17 kg, 95% Confidence Interval [$CI_{95\%}$] 0.13 – 4.21 kg, d = 0.13) and BMI (MD = 0.89, $CI_{95\%}$ 0.15 1.64, d = 0.16) in the control wait group, than the training group at baseline. While significant, the magnitude of the differences and effect size in both cases was small.

Table 3: *Descriptives for the care home residents included in the cluster randomisation (mean ± SD).*

	Train (Group 1) *n = 575*	**Wait (Group 2)** *n = 465*	**Independent t-test**		
			$t_{(1038)}$ =	p =	d
Age (years)	86.00 ± 8.71	86.81 ± 7.78	-1.564	0.118	0.10
Weight (kg)	62.13 ± 15.94	64.30 ± 16.87	**-2.090**	**0.037**	**0.13**
Height (m)	1.62 ± 0.10	1.62 ± 0.09	-0.778	0.437	0.00
BMI	23.72 ± 5.44	24.61 ± 5.81	**-2.348**	**0.019**	**0.16**
% Weight Difference (previous 3 months)	-0.23% ± 0.06	-0.40% ± 0.07	0.475	0.635	0.03

Note: kg kilogram; BMI body mass index

Using the MUST tool the prevalence of care home residents at risk of malnutrition (scoring greater than 0) was 30.5% at baseline (Table 4). There were only very small differences in the distribution of MUST scores between the two groups. A greater number of the wait control group did not have MUST scores (86, vs. 48 in train group). One-hundred and thirty-one (12.6%) of the care home residents included were noted to have ONS already prescribed to them at the time of the baseline visit. Of those prescribed ONS at baseline 37 were assessed to have a MUST score of 0.

Table 4: *MUST scores at baseline for care home residents assigned to the training and wait groups.*

MUST Score	**Train (group 1; n = 575)**		**Wait (group 2; n = 465)**	
	n	**%**	**n**	**%**
0	347	65.8%	241	63.6%
1	80	15.2%	65	17.2%
2	74	14.0%	58	15.3%
3	17	3.2%	9	2.4%
4	9	1.7%	6	1.6%
No Score	48		86	

Note: MUST malnutrition universal screening tool

Results at 3- and 6-month follow-up

From the 38 care homes, 1,040 care home residents were included in the analysis. Data were considered on an intention to treat basis, 150 residents were not assessed for the 3-month review (14.4%), 317 for the 6-month review (30.5%), and these residents' data were replaced by the last recorded value.

Anthropometry

Table 5 summarises changes occurring in anthropometry between groups over the study period. There were no statistical differences in any of weight, percentage weight change or BMI over time, or between groups.

Table 5: *Anthropometric measures at baseline, 3-month and 6-month review*

	Train (Group 1)	Wait (Group 2)	ANOVA F =	ANOVA P =	η_p^2
Weight					
Baseline (Kg)	62.1 ± 15.9	64.3 ± 16.9	0.778	0.460	0.001
3-month Review (Kg)	61.6 ± 15.8	64.5 ± 17.1			
6 Month Review (Kg)	61.8 ± 16.1	64.7 ± 17.0			
% Weight Difference					
Baseline (%)	-0.23 ± 6.11	-0.40 ± 7.00			
3-month Review (%)	-0.37 ± 7.12	-0.30 ± 6.54	0.373	0.688	0.000
6 Month Review (%)	-0.50 ± 7.47	-0.81 ± 6.90			
BMI					
Baseline	23.7 ± 5.4	24.6 ± 5.8			
3-month Review	23.5 ± 5.4	24.6 ± 5.8	0.730	0.482	0.001
6 Month Review	23.6 ± 5.5	24.6 ± 5.8			

Note: ANOVA analysis of variance; Kg kilogram; BMI body mass index; η_p^2 *partial eta squared*

MUST Score

Table 6 summarises the changes in MUST scores that occurred in residents by intervention group. No change in MUST score was the most common outcome across all intervention groups. Accounting for differences in group sizes and residents who had not been assigned MUST scores due to missing weight or BMI data, there were no differences between the train and wait control group at the 3-month review for either group. However, at the 6-month review, the percentage of residents in the train intervention group with no change in score increased, with a reduction in worsening and improving scores. There were no notable differences or changes over time in the ability of the care home staff to accurately determine MUST scores, the accuracy of MUST scores were still low at 3- and 6-month review (~29%).

Table 6: *Change in MUST score and accuracy of care home assessment following study interventions.*

	Train (Group 1) (n)	%	Wait (Group 2) (n)	%	Total (n)
Change in MUST score					
Baseline - 3 month review					
Improved (decreased)	72	13.9%	54	14.6%	126
Stayed the same (0)	376	72.4%	269	72.5%	645
Worsened (increased)	71	13.7%	48	12.9%	119
Baseline - 6 month review					
Improved (decreased)	48	9.3%	48	13.3%	96
Stayed the same (0)	425	82.0%	257	71.2%	682
Worsened (increased)	45	8.7%	56	15.5%	101
Accuracy of MUST score					
Baseline					
Correct (n =)	298	72.0%	190	71.4%	488
Incorrect (n =)	116	28.0%	76	28.6%	192
3 month review					
Correct (n =)	303	72.1%	217	70.7%	520
Incorrect (n =)	117	27.9%	90	29.3%	207
6 month review					
Correct (n =)	307	71.2%	204	70.6%	511
Incorrect (n =)	124	28.8%	85	29.4%	209

Note: MUST malnutrition universal screening tool

The prevalence of care home residents at risk of malnutrition (scoring greater than 0) at 3-months was 34.0% for train and 35.1% for the wait, both groups increased by a small percentage at the 6-month review to 35.5% for the train group and 37.4% for the wait; such differences may be due to a seasonal effect. The number of residents with ONS prescriptions and MUST scores of 0 decreased. At 3-months 26 of the train group and 15 of the wait group had MUST of 0 (41 total ONS and MUST score 0) and at 6-months 22 of the train group and 12 for the wait group (36 total ONS and MUST score 0).

Resident Outcomes

The frequency of Hospital admission rates and average length of admission were compared between intervention groups and over the three assessment periods (**Table 7**). There were small differences in the frequency of admission, both decreasing over the study period (baseline – 14.6% and 17.2%, 6-months 12.1% and 10.5%, for train and wait respectively). Of those residents who were admitted within the evaluation period, there were differences in the average length of stay between groups (longer in wait group) and over time (decrease from baseline to 3-month review, increase back to 6-month review). While both groups followed similar pattern, the length of stay did not increase at 6-month review in the train intervention group back to baseline levels, unlike the wait group.

Table 7: *Hospital admission data, frequency of occurrence and average length of stay.*

	Train (Group 1)		Wait (Group 2)	
Hospital Admissions – Occurrence (n =; %)				
Baseline	82	14.6%	72	17.2%
3-month Review	68	12.0%	54	11.7%
6 Month Review	69	12.1%	46	10.5%
Average Length of Admission (mean ± SD)				
Baseline	12.4 ± 9.4		16.6 ± 7.8	
3-month Review	8.5 ± 7.0		13.5 ± 5.4	
6 Month Review	10.7 ± 5.7		16.7 ± 4.6	

The frequency of UTI infections, falls, pressure sores and the prescription of laxatives are presented in **Table 8**. Small differences were apparent in each variable. The relative occurrence of UTI decreased over the period of evaluation, irrespective of group, the same was true of falls and pressure sores. The number of residents with laxative prescriptions increased for both groups. The increase in prescription of laxatives increased to a greater degree for the train first group (52.6% to 58% vs. 51.8% to 54.7% for train and wait groups, respectively). These differences may be due to a seasonal effect.

Table 8: *Frequency and relative occurrence of UTI, falls, pressure sores and laxative prescriptions.*

	Train (Group 1)		Wait (Group 2)	
UTI – Occurrence (n =)				
Baseline	56	9.9%	47	10.2%
3-month Review	66	11.6%	52	11.3%
6 Month Review	47	8.3%	32	7.2%
Falls – Occurrence (n =)				
Baseline	137	24.2%	100	22.9%
3-month Review	109	19.1%	93	20.3%
6 Month Review	95	21.8%	84	19.3%
Pressure Sores – Occurrence (n =)				
Baseline	47	8.3%	35	8.1%
3-month Review	41	7.2%	28	6.2%
6 Month Review	29	5.1%	20	4.6%
Laxative Prescription – Number (n =)				
Baseline	288	52.6%	227	51.8%
3-month Review	315	55.7%	252	55.1%
6 Month Review	328	58.0%	235	54.7%

Nutritional supplements

Table 9 summarises the number of ONS prescriptions, changes made following ONS review and savings made. Analysis of the interventions made by the dietitians highlighted issues with the implementation of the ONS stops and switches. For the train group the data suggest that after baseline 32 interventions were not implemented correctly (47 correct), similarly, for the wait control group after baseline 23 interventions were not implemented correctly (29 correct). The same was true following the 3-month review for the train group, with 40 interventions incorrectly implemented (39 correct) and the wait group 19 incorrectly implemented (38 correct).

However, considering only savings made at baseline and 3-month review for the residents whose prescription was correct at the next review the savings were still considerably greater for the train group than the wait control group, with differences apparent in both total, and value divided by the number of interventions (**Table 9**).

Table 9: *ONS prescriptions, their implementation and value of savings made*

	Train (Group 1)		**Wait (Group 2)**	
ONS prescription (n =)				
Baseline	79	13.7%	52	11.2%
3-month Review	79	13.7%	57	12.3%
6 Month Review	77	13.4%	56	12.0%
Implementation	Correct	Incorrect	Correct	Incorrect
Baseline	47	32 (40.5%)	29	23 (44.2%)
3-month review	39	40 (50.6%)	38	19 (33.3%)
Total Value savings made (£)	Total (per intervention)		Total (per intervention)	
Baseline	£1647.42 (£19.38)		£635.04 (£11.76)	
3-month Review	£1084.61 (£13.73)		£401.52 (£6.81)	
6 Month Review	£4155.77 (£53.97)*		£3018.24 (£53.90)*	

* does not take into consideration the correct implementation of the intervention made by the dietician.

Methods – GP practice patient reviews

Overview

In conjunction with the education and review of care homes ONS, a second dietitian has assessed, reviewed and supported GP practices with patients prescribed ONS within their own home. These patients have been identified from the 10 GP practices with the highest cost of prescribing per 1000 patient population in Southern Derbyshire. It is estimated, based on information available from the Chesterfield Royal Prescribing project, that 1400 patients (0.51% of the GP population from Southern Derbyshire's top 10 prescribing practices) will have ONS prescriptions.

Practices were identified, access to the practices record system organised, patients short-listed and decisions made about the suitability of the ONS prescriptions. Based on the dietitians' review, decisions were made to leave ONS unchanged, change to a cheaper alternative, or stop the ONS prescription. If further follow-up was deemed necessary, a referral was made to the through refereeing patients on to the community dietetics team. No patient outcomes were recorded.

Selection of GP practices and Patients

Patients have been identified from the 10 GP practices with the highest costs of prescribing per 1000 patient population. Potential patients for review were identified by the practice searching for adult (> 18 years) patient on supplements in last 6 months. Patients in care homes were excluded. The notes of these patients were then reviewed and excluded based on the following criteria:

- Exclude anyone on supplements not on the list, such as probiotics;
- Exclude anyone who has supplements as part of tube feeding;
- Exclude anyone who has stopped taking ONS (sometimes requires a phone call to ascertain this)
- If the patient was under a dietitian already they were not reviewed, but the dietician did interact with the dietitian involved to ensure they were still reviewing and may request they update GP/review patient.

Results – GP practice patient reviews

Up until the end of February 2018 the patients of five practice had been shortlisted, resulting in 117 detailed patient reviews to take place.

The reviews have resulted in a total cost savings amounted to **£2,766.80** (first month after ONS review). Of the patients prescribed ONS at the time of review, 83 required no change in prescription; cost savings resulted because of 17 changed to alternatives (£816.76) and 35 stopped saving (£1950.04). Projected **12-month savings of £33201.55** and **part-year savings until the end of March 2018 of £116100.34** (rounding months to the nearest whole).

Very few patients had a MUST score calculated and where it was, it was incorrect. GPs in the reviewed practices have been advised on how to follow the recommended steps appropriately for patients seeking supplements.

Further indirect benefits realised through the project:

- Provided food fortification advice to a number of patients who had stopped supplementation so as to prevent further malnutrition and identified further patients who were at risk of further malnutrition and referred them on for further dietetic review.
- It has also become apparent that there are further indirect benefits that may be derived from the dietitians' work reviewing patients.
- Improved communication between dietitian and GP practice. They have become a point of reference for GP practice, which is likely to improve patient care and reduce demands on GPs
- GP Practices have increased awareness of ONS cost saving through GP education.
- Liaised with practice pharmacist to help develop a protocol to stop GPs supplementing without following the guidelines.

Significantly, the project has also identified issues with the communication between hospital dietetics team and GP practice, resulting in recommendations to hospital and re-drafting of the standard letter. There was some concern over follow-ups for patients. The PID sets out only the initial review. This has been mitigated through referring patients on to the community dietetics team. There is significant potential for future work, for example for one GP surgery if all the patients under specialist dietitians were swapped to cheapest form savings of approximately £10 a day could be realised.

Summary and Recommendations

Summary

The evaluation of Southern Derbyshire CCG review of ONS in care homes and GP practices was conceived based on the success of an earlier pilot study. The pilot realised significant cost savings and improved residents' outcomes in a small number of care homes. This report presents the findings of the two aspects of the expanded project up until the end of February 2018, which (a) extend the initial pilot

review across care homes in Southern Derbyshire; and (b) reviewed the use of oral nutritional supplements of patients in their own home and identified those needing dietetic input within Southern Derbyshire CCG. The work of Derby Hospitals Community Dietetic Team has been substantive, reviewing residents across 77 care homes and 5 GP practices. This has realised significant cost savings (part year until end March '18 care homes: £83k and GP practices: £33k), without any notable changes in resident outcomes (positive or negative). However, the analysis of the dataset has identified a number of issues with the implementation of the dietitians' recommendations. Principally, while recommendations to stop or switch residents' prescribed ONS supplements were made, between 49% to 67% of the time these recommendations were not acted upon. The following summary will briefly discuss the results and make recommendations based on the findings.

The project set out to assess malnutrition and ONS in 112 care homes across Southern Derbyshire, then provide the care home staff with training on MUST assessments and a 'Food First' food fortification approach. At the time of writing 77 of the care homes approached had received at least the baseline review, 16 had declined and 17 were yet to be reviewed. Of those care homes, and staff members, who had received training, feedback was overwhelmingly positive (Table 2). All but a very small minority (1-2 persons) responded as being confident in MUST scoring and food fortification, a significant proportion responded saying that they would change their way of working. Of the 38 who stated they would not change their practice it is unclear if that it was based on existing knowledge or a reluctance to change. While these results are positive, considering the lack of change in the accuracy of MUST scores (Table 6), further work with care home staff may be necessary. Following the intervention, there was no change in the accuracy of MUST scoring (Table 6). Based on these findings it is recommended that further training, or understanding the work of staff may be necessary to translate learning into improved MUST scoring (R1).

The project, like the pilot, has realised significant cost savings from ONS stops and switches in both care home and GP practice settings. Savings for the care homes until the end of February 2018 amounted to £83k part year until the end March '18 (or 12 months saving £170k). For the GP practices reviewed to date part-year savings until March '18 amounted to £33k (or 12-months savings of £116k). Projected savings are lower than those previously suggested in the interim report due to the identification of an issue with the implementation of stops and switches in the care homes. Considering the implementation of the supplementation suggestions made by the dietetics team, it is apparent that recommendations were only acted upon between 49% - 67% of the time. Through subsequent conversations, it is apparent that these issues likely related to the uptake of advice by GPs. As a consequence of these findings, recommendations to mitigate this issue are as follows. Firstly, data should be recorded in such a way as it is possible to review implementation and uptake of advice on changes in ONS prescription (not one line per review) (R2); secondly, there must be better integration with GP practices in order to ensure uptake of dietetic advice (R3).

In order to determine the efficacy of the intervention on MUST scoring and residents' outcomes in the care homes, a cluster randomised, waiting list controlled evaluation with an intervention was conceived. Such an approach was deemed necessary as there is only a small body of evidence (and the outcome of the earlier pilot) to support the use of alternatives approaches to managing malnutrition in care home residents beyond ONS. For example, Olin et al. (2003) found that increasing the energy density of meals through food enrichment can increase an individual's overall caloric intakes up to 30%, and a systematic review of the dietary counselling indicated that counselling gave comparable increases in weight to oral nutritional supplement use (Baldwin & Weekes, 2012). As a result, a subset of the care homes from Southern Derbyshire were initially allocated to training (intervention) or wait (control) groups. Considering drop out, those who had yet to be assessed and those with too greater time between baseline and re-assessment, 38 care homes were included in the final analysis, made up of 1040 care home residents (Figure 1).

Considering differences between the two groups of the controlled sub-set of the ONS dataset, there were no differences either between interventions or over time for residents' anthropometrics (weight, percentage weight differences over the past three months or BMI; Table 5). There were small differences at the 6-month review in the stability of the MUST scoring of residents, with fewer MUST scores changing in the training group. However, given differences were not found in the direct anthropometric measurements and only represented a small percentage difference, caution should be given to this result. Similar to anthropometry, only small differences in hospital admission and no differences in residents' outcomes in terms of the occurrence of UTI infections, falls, pressure sores or laxative prescriptions were apparent (Table 8). It is also conceivable that small differences occurred due to seasonal variation. Considering the effectiveness of dietetic advice on nutritional status found by Mountford et al. (2016) the lack of difference between intervention groups (train or wait) that were apparent in anthropometrics or residents' outcomes likely occurred because of the low uptake of dietetic advice on stops and switches of ONS prescriptions. As previously discussed, the uptake for the baseline and three-month review (for which follow-up data were available) were between 49% and 67% (Table 9). Consequently, because of these findings and the low uptake of dietetics advice future work carried out by the dietetics team should continue to consider the efficacy of interventions (R4), and further outcomes (R5).

The more detailed analysis of ONS prescriptions and costs savings between the cluster-randomised sub-sets revealed the previously discussed issues with the potential overestimation of cost saving in initial estimations. It was apparent that 49% to 67% of the time dietetics advice was not acted upon. However, despite this there were still greater cost savings realised in the training group than the wait group (£19.38 vs. £11.76 per resident with ONS at baseline and £13.73 vs. £6.81 per resident with ONS at the 3-month review). These still amount to considerable cost savings and are a testimony to the efficacy of the ONS review and education of care home staff. Further, these cost savings are realised without any apparent change in residents' outcomes. This was also reflected in a decrease in the number of residents prescribed ONS with MUST scores of 0. Change in the implementation and adherence of residents and GPs to dietetics advice would improve the cost savings considerably, for little additional work.

The review of GP patients with ONS, who were identified from the 10 GP practices with the highest cost of prescribing per 1000 patient population in Southern Derbyshire, resulted in significant cost savings. It is anticipated, but not known, that because the interventions were made within the GP practice using the practice's systems, that the percentage of implementation was considerably greater for this aspect of the project. Further, there were a number of notable indirect benefits resulting because of the dietician spending time within the practice, including improved communication between dietitian and GP practice. They have become a point of reference for GP practices, which is likely to improve patient care and reduce demands on GPs and GP Practice have increased awareness of ONS cost saving through GP education. Significantly, the project has also identified issues with the communication between hospital dietetics team and GP practice, resulting in recommendations to hospital and re-drafting of the standard letter. There was some concern over follow-ups for patients. The PID sets out only the initial review. This has been mitigated through referring patients on to the community dietetics team. There is significant potential for future work, for example for one GP surgery, if all the patients under specialist dietitians were swapped to cheapest form, savings of approximately £10 a day could be realised. Based on this, recommendations are made around the continued review of ONS in the community and the education of GPs (R6).

Conclusion

To conclude, the programme of work of Southern Derbyshire CCG and Derby Hospitals Community Dietetic Team in care homes has resulted in significant cost saving, with no appreciable change in patient's outcomes. However, while care home staff reported greater knowledge of MUST scores, food fortification and that their practice would change, following training there were no appreciable changes in MUST scoring accuracy (R1). Issues were also identified with the implementation of the ONS

prescription recommendations, with only 49% to 67% acted on; it is recommended that data is recorded in a way that advice uptake can be monitored (R2) and closer relationships with GPs are developed, to ensure that changes are implemented (R3). As a result of the low uptake of recommendations, future work should continue to consider the impact on residents outcomes (R4 & R5). Finally, given the financial saving realised through the review of ONS prescriptions in GP practices and benefits of improvements in GP understanding, future work may consider expanding the number of practices involved and including elements around increasing GP education of ONS prescription and alternative interventions (R6).

Recommendations

R1 – The dietetics team should consider further training for care home staff on MUST scoring as, while staff are confident in its use, the training did not translate into improved accuracy of scoring.

R2 – To facilitate the assessment of the implementation of recommendations dietitians should record reviews on a 'one patient per row' basis, rather than 'one review per row' in order to follow patients through.

R3 – Future work must consider the relationship between the care home, GP practice and dietitian to improve the uptake of dietetic advice.

R4 – Future implementations of the review of ONS in care home residents should continue to adopt methodologies that allow for the efficacy of the intervention to be determined, as the current project is inconclusive due to the low uptake of advice.

R5 – Future work may wish to consider handgrip strength, functional movement and/or depression, which may be key outcomes in Food First methods of the management of malnourished residents.

R6 – Future work should continue to explore ONS in community settings. There may be a benefit to GP education around the prescribing of ONS.

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